DOCUMENT RESUME

ED 397 484 EA 027 719

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TITLE Allocating Resources to Academic or Vocational Secondary Education for Economic Development? Empirical Evidence for Priorities of Investment in Education.
PUB DATE Oct 95
NOTE 16p.; Paper presented at the North-East/Mid-West Regional Conference of the Comparative and International Education Society (Buffalo, NY, October 1995).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Correlation; *Cross Cultural Studies; *Developing Nations; *Economic Development; *Expenditures; Public Education; Regression (Statistics); *Resource Allocation; Secondary Education; Vocational Education

ABSTRACT

Education is a key for the economic growth and social development of developing countries. This paper presents findings of a study that analyzed how scarce resources should be allocated to the two types of secondary education--academic and vocational. Methodology involved correlation and regression analysis of World Bank data on the Gross National Products (GNPs) of over 100 countries and of educational expenditure variables from the UNESCO Statistical Yearbook, 1982. Findings indicate that the allocation of more inputs to academic education (in the form of expenditures, teaching staff, and pupils) had a positive effect on economic development. Countries that allocated more inputs to academic education in 1980 grew more rapidly throughout the decade than those countries that allocated fewer inputs. The data show that vocational education had some structural inefficiencies. Policymakers should allocate greater inputs to academic secondary education and increase the efficiency of secondary vocational education. Two tables are included. (Contains 12 references.) (LMI)

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ED 397 484

Paper delivered at the Comparative and International Education Society North-East/Mid-West Regional Conference, Buffalo, Oct. 1995

"Allocating Resources to Academic or Vocational Secondary Education for Economic Development?

- Empirical Evidence for Priorities of Investment in Education -"

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I. Introduction

Education is a key for the economic growth and social development of developing countries. Almost all the governments of the Third World have put high priority on the expansion of public education and have spent much of their precious resources on this sector. In order to use the limited resources in developing nations, the discussion of allocation of inputs in education is crucial. This study will analyze empirically how scarce resources should be allocated to the two types of secondary education, academic and vocational.

II. Research Questions

In order to benefit economic development, which type of education, academic or vocational, should receive greater inputs of expenditure, teaching staff and pupils?

III. Literature Review

Many studies have examined the effect of vocational vs. academic secondary education for development in the Third World. The results of this research are somewhat contradictry. Some assert the importance of vocational education for development. Others assert the cost effectiveness of academic education.

Vocational education has been favored by educational policy makers in developing countries and international aid agencies. "Education and Development " (1990) of World Bank Discussion Papers explained that vocational education's popularity among policy makers stems from its social functions such as the tendency of vocational education to be substituted for academic education for students who do not succeed academically. "Policy makers want to prepare these less academically able students for some sort of practical work and to reduce pressure on higher education by making vocational education terminal."

Analyzing international assistance to education in the developing countries, Kenneth King (1991) claimed that donor agencies, multilateral and bilateral, have put highest priority on vocational education because it was "the single most obvious way to offer educational aid in the early years of their assistance" in order to encourage industrialization of the recipient countries.

Several researchers have confirmed these policy makers' expectations. With a labor survey of Ivory Coast in 1984, Komenan (1987) found that vocational education had higher payoffs than general education. Chung (1987), using Hong Kong census, 1976 and 1981, also found that returns to vocational education were higher than to academic education, but significant only for the rapid growing electrical and commercial sectors. Based on a survey of workers in the Beijing General Auto Industry Company, Min and Tsang (1987) concluded that productivity of workers with vocational education was 7% higher than those with general secondary education. Ziderman (1988) used a 1987 Israel census and found that vocational secondary schooling is more cost-effective than general education for those who do not go on to post-secondary education. With a labor force survey in Trinidad & Tobago, Chin-Aleong (1988) pointed out that specialized craft students found jobs more quickly and earned better salaries than did academic students.

On the other hand, relatively more of the research has challenged the policy makers' belief that vocational education is the best investment in education for economic development. Some emphasize the high cost of vocational education. Hinchliffe (1983) found that total annual unit recurrent costs are 19% higher in agricultural schools, 13% higher in technical schools, and 9% higher in commerce schools compared with academic schools in Tanzania. Cummings, et al. also found that staffing costs are twice and capital costs are five times as much for industrial education subjects as for classroom subjects.

Another study showed low returns of vocational education. Godfrey (1977) pointedout that graduates in Kenya with school vocational training are 14-25% less likely to pass government craft tests than those with no such training. Psacharopoulos has conducted research on the efficiency of vocational education for economic development. With Loxley (1985), he found that there is no labor advantage to graduates from vocational courses, either in terms of success in finding employment or pay levels when employed either in Colombia or Tanzania. He also (1993) claimed that the returns to academic secondary school track are higher than those to vocational track. (Table 1) His research indicates that the difference between the profitability of the two school systems is larger in terms of social returns because of the much higher cost of vocational education.

Although so much research has been done on vocational vs. academic secondary education with micro level cost effective analysis of various contexts, no study has been done using cross-sectional world level analysis. Although educational decisionmaking can never be apart from each context, this research intends to capture general tendency of the effect of educational input allocation on economic development using a cross national study method. Following, this research will explore the reason why one type of education is more efficient structurally than the other. It is hoped that this study may indicate a more general idea about the relationship between the inputs to two types of education and economic development (output) and it may provide educational policy makers with useful information about efficient educational administration for academic and vocational secondary education.

IV Research Methods

(1) Regression Analysis

This study uses multiple regression analysis with a time lag to identify the effect of input variables of academic and vocational education on economic growth with cross national

data, from over 100 countries. The data on GDP is obtained from the World Tables of several years published by the World Bank. The educational expenditure variables are from UNESCO Statistical Yearbook, 1982. The existence of missing data and insufficient standardization of data collection are potential problems, especially for educational input variables. The regression model of this study is as follows.

$$Yt = b0 + b1*Yt\text{-}1 + b2*Xt\text{-}1 + e$$

Yt = Gross National Product per capita in 1990
Yt-1 = GNP per capita in 1980
Xt-1 = Educational Input Variables in 1980

To answer the research question, this regression will run with the following different educational input variables independently to identify the effect of each input variable of academic and vocational education on the growth of GDP per capita.

(a) Educational expenditure for academic secondary education as % of educational expenditure for secondary education in 1980
(b) Educational expenditure for vocational secondary education as % of educational expenditure for secondary education in 1980
(c) The number of teaching staff of academic secondary education as % of the total number of teaching staff of secondary education in 1980
(d) The number of teaching staff of vocational secondary education as % of the total number of teaching staff of secondary education in 1980
(e) The number of students of academic secondary education as % of the total number of students of secondary education in 1980

(f) The number of students of vocational secondary education as % of the total number of students of secondary education in 1980

Then, (a) and (b), (c) and (d), and (e) and (f) will be compared to see the difference of the effect of inputs between academic and vocational secondary education.

This type of regression model is generally called a panel design, in which a time gap is put between the dependent variable and the independent variable. This model is more effective in identifying causation than a model in which the times of the independent and dependent variables are the same. In this model, because we set the time of the dependent variable t and the time of the independent variable t-1, the dependent variable of t-1 must be put as an independent variable to control the already existing effect of the dependent variable of t-1. In this research the time gap is set as 10 years. Although I recognize other possibilities, for example, 20 years instead of 10 years, I decided on 10 years because the oil shock had a presumably great impact on economic growth in oil producing countries in the 1970's.

(2) Correlation Analysis

In the above regression analysis the educational input variables are set as proportions of academic or vocational education in the total secondary education to investigate the effect of allocating pattern of limited inputs on economic development. Therefore, allocating more inputs to vocational education results in allocating less to academic education or vice versa. Here in this correlation analysis we will examine the association between economic growth and differently calculated input variables, which are proportions of inputs in total GDP or population to investigate general tendency of association of economic growth and educational inputs. Correlation Matrix will be presented with the following variables.

(a) Educational expenditure for academic secondary education as % of GDP in 1980

(b) Educational expenditure for vocational secondary education as % of GDP in 1980

(c) The number of teaching staff of academic secondary education as % of population in 1980

(d) The number of teaching staff of vocational secondary education as % of population in 1980

(e) The number of students of academic secondary education as % of population in 1980

(f) The number of students of vocational secondary education as % of population in 1980

(g) Economic growth rate of 1980's

V. Results

Table 2 is the result of the regression analysis. It shows that a country which allocate more inputs to academic education in 1980 grew more rapidly throughout that decade. Although regressions with the input of expenditure and pupil did not obtain statistical significance, all the directions of the regression results are the same and confirmed that allocating more inputs to academic education has a positive impact on economic growth. There is a significant positive impact on economic development of allocating more teachers to academic education. All the regressions with inputs on vocational education showed their negative association with economic growth. However, this does not mean that vocational education itself has a negative impact on economic development. It occured because allocating more inputs to vocational education results in allocating less to academic education. In the correlation analysis, once we used the input variables, which are a proportion of the total GDP or population, the associations between inputs and economic growth became positive. The correlation matrix of Table 3 shows that all the associations are positive, however, the association between inputs to academic education and economic growth are much larger than those between inputs to vocational education and economic growth. Apparently the findings confirmed the importance of academic education for economic growth, which has been suggested by some previous research.

VI. Discussion

The purpose of this paper was to identify efficient allocation patterns of educational inputs for economic development. The statistical analysis suggested that allocating more inputs to academic education has a positive impact on economic development. This finding confirmed some of the previous findings of studies on academic vs. vocational education as development policy. The new point of this research is that the results are obtained not from micro-level case specific research but from cross-national world-level research. Cross-national research made it possible to conclude that there are some structural inefficiencies in vocational education, while there were already several case study reports which addressed the inefficiencies.

Implications of the finding can have two directions. One direction is that policy makers should allocate more inputs to academic secondary education. Metcalf (1985) suggested that "vocational secondary school is less cost-effective than more informal firm-based training." Vocational training may be better to operate in or near real work place so that it can be more sensitive to needs of actual work and technology innovation. Following this suggestion, a formal school system should concentrate on teaching academic curriculum. The second direction is that policy makers should try to make vocational secondary education as efficient as possible. Cross-national analysis showed only a general tendency of inefficiency in vocational secondary education. There should be some exceptional countries in which vocational education has more impact on economic development. It is possible to find these "outlier" countries statistically. The investigation of educational policies of these "outlier" cases can hopefully indicate new directions of vocational secondary education. This is possible further research following this cross-national study

of academic and vocational education. (Also, it is interesting to investigate the reason why the academic secondary education failed in these "outlier" countries.)

So, another question can be raised, "who will make vocational education more efficient?". Certainly, a government is one of the primary actors which can influence a national training system by correct policy decision making. However, in terms of vocational education, the influence and commitment of the private sector is even more important because most of the graduates are hired by this sector . Unless acknowledging the needs and expectations of the private sector for new employees, an educational administrator can never make vocational education efficient. Cooperation between governments and private sectors on vocational education is necessary to construct reasonable national training systems.

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Table 1 Returns to investment in education by curriculum type (%)

Curriculum Type	*Rate of Return*	
	Social	*Private*
Academic/General	15.5	11.7
Technical/Vocational	10.6	10.5

Source: "Returns to Investment in Education A Grobal Update", 1993, by George Psacharopoulos

Table 2 *The effect of educational expenditure on economic growth*

Model $Yt = b0 + b1*Yt-1 + b2*Xt-1+e$

	Parameter Estimate	*Standard Error*	*T value*	*Prob > ITI*	*R square*
Xt-1(a)	136.808698	155.7177773	0.879	0.3839	0.9273
Xt-1(b)	-207.072745	360.2423867	-0.575	0.568	0.9263
Xt-1(c)	1903.249994	682.8328711	2.787***	0.0082	0.9715
Xt-1(d)	-1981.026252	900.6914317	(-2.199)**	0.0342	0.9707
Xt-1(e)	838.012143	607.3520541	1.38	0.1712	0.9586
Xt-1(f)	-792.272588	668.6816777	-1.185	0.2393	0.9584

* P < 0.1
** P < 0.05
*** P < 0.01

Yt = GNP per Capita in 1990
Yt-1 = GNP per Capita in 1980
Xt-1(a) = Educational expenditure for academic secondary education as % of educational expenditure for secondary education in 1980
Xt-1(b) = Educational expenditure for vocational secondary education as % of educational expenditure for secondary education in 1980
Xt-1(c) = The number of teaching staff of academic secondary education as % of the total number of teaching staff of secondary education in 198
Xt-1(d) = The number of teaching staff of vocational secondary education as % of the total number of teaching staff of secondary education in 19
Xt-1(e) = The number of students of academic secondary education as % of the total number of students of secondary education in 1980
Xt-1(f) = The number of students of vocational secondary education as % of the total number of students of secondary education in 1980